

The Institution of Engineers, Australia; Sydney Division  
**Engineering Heritage Committee**

## **ORAL HISTORY PROGRAM**

### **INTERVIEW TAPE LOG**

**INTERVIEWEE :** Lyndon Roy LEEMBRUGGEN

**TAPE NUMBERS :**

IEA SYD: NW1, NW2 &  
NW3

**INTERVIEWER :** Nuala WARD

**INTERVIEW DATE :** 24 October 1998

**NUMBER OF TAPES :** 3

**RESTRICTION ON USE :**

This interview is part of the Oral History Project of the Engineering Heritage Committee  
of the Sydney Division the Institution of Engineers, Australia.

Tape : IEA SYD : NW1, Side A		
TIME	SUBJECT	NAMES & KEYWORDS
0	Family background	Father: Lyndon, Mother: Eleanor Nell North Strathfield
18	School: 1938-39 Summer Hill Boys Practice School School experiences: "The Airplane" school magazine Subjects studied at school Interests at schools: airplanes, debating School trip to Newcastle	North Strathfield Public School Summer Hill Boys Practice School Sydney Technical High School - Paddington Newcastle
71	1945 - Matriculation, began study at Sydney University 1946 - Sydney Technical College - Mechanical Engineering Diploma Cadetship with father's company Reasons for choosing Mechanical Engineering	Sydney University Sydney Technical College Mechanical Engineering Diploma
110	Influences of aeronautics on design of trains	Electrical Vehicles Double Decker Trains
118	Post-war impressions of Australian society Australia's involvement in the war effort: gear boxes, milling machines	Australia - war effort
132	Courses studied in Diploma Cadetship training activities e.g. visiting pattern makers	Mech. Engineering Diploma Cadetship training
152	Building fitting and equipment for passenger trains, axles, doors, windows Describes work done at Clyde Engineering, Tulloch	Leembruggen, Hoskins and Spencer Pty Ltd. Clyde Engineering Tulloch
180	Manufacturing Techniques - metals, plastics, extrusion, forming, electrical arc welding, riveting	Manufacturing techniques Sydney Harbour Bridge
205	1949 - finished diploma and Cadetship Joined Comeng as design draftsman 1950-52 - Comeng: worked on the design of the Queensland trains. Design from scratch: bogies, carriages. Special design techniques used because of Queensland being prone to flooding Why the move to Comeng	Comeng (Qld) Queensland Trains: Sunlander, Inlander, Westlander Monocoque vehicles Design techniques used
285	Design Draftsman. Section leader for interior design. These were the first air- conditioned trains Explains the design process for these narrow gauge trains	Interior design of trains Narrow Gauge Trains Gauge design design process
318	1952: Married and moved back to Sydney, NSW Works Manager involved in subcontracting, tendering Explanation of the Operation of Leembruggen, Hoskins and Spence Pty Ltd.	Leembruggen, Hoskins and Spence Pty Ltd.
365		Tulloch, Comeng, Clyde Engineering, Goodwins, Martin and King., Rhodes, Clyde Melbourne Electric Trains
379	Reasons why Leembruggen, Hoskins and Spence Pty Ltd. closed down	Leembruggen, Hoskins and Spence Pty Ltd.
408	1956: moved to Comeng Granville Involved in engineering work and design: Rolling Stock, refrigerator wagons, stainless steel carriages	Comeng - Granville Design of Rolling Stock First stainless steel carriages

Tape : IEA SYD : NW1, Side B		
TIME	SUBJECT	NAMES & KEYWORDS
0	Alcan: work in marketing, sales; selling aluminium alloys	Alcan Australia
38	Tulloch: Rolling Stock Engineer	Tulloch
50	Problems with over-crowding of trains, automatic closing doors Double Decker train design - tender for 120 train carriages 1926 - first electric trains in Sydney	Double-decker trains retrofitting of old trains automatic closing doors loading stock gauges Train carriage tender proposal
97	Secrecy of tenders Tender response including single and double-deck carriages	
109	Weight adjustments required to carry extra 62 passengers for double-decker trains	Design of double-decker trains Bogies, pantograph
120	Receivership of Tulloch	Tulloch
130	Difference between European and US train design - different standards Development and design phase of double-decker carriages including vestibule design, passenger flow	European & US train design Design & development of double-decker trains 1964-1968 Commissioner Neil McCusker Tangara trains
218		
260	Engineering solutions	
274	Design of automatic electric doors for trains	Train - automatic electric doors
293	Time spent at Tulloch Finishing up at Tulloch - retrenchment	Tulloch
328	Differences between proposed and end product of Rolling Stock.	alloy structure of Rolling Stock Steel & aluminium corrosion Shape of carriages. doors Ampol Petroleum
354	Automotive and technical services engineer and marketing focus	
410	Immigrants and their skills which they brought to Australia and their effects on work practices	Immigrant skills Work Practice



Tape : IEA SYD : NW2, Side A		
TIME	SUBJECT	NAMES & KEYWORDS
0	Marketing manager for transport. Some of the products produced included aluminium boats, flared bow aluminium boats, aluminium truck bodies, buses, bulk wagons for railways	Alcan Australia Aluminium products
30	Methods used in fabrication including an explanation of monocoque.	Monocoque Methods of fabrication
54	Queensland Railway - aluminium hopper wagons	Queensland Railway Chief Mechanical Engineer, Mr Bill Caskley Comeng, Comalco
60		
75	Challenges of engineering design	
100		Comalco aluminium bulk wagon
115	1968 - Transition to own consultancy company	1968 - own consultancy company, West Ryde
138	First major project - Guinnennes of Newcastle Tenders for cattle wagons, refrigerator wagons. Discussion of running the company & starting up, problems of running your own business	Guinnennes of Newcastle Running of consultancy firm
184	SA Government - electric vehicles. Types of consultancy done in company	SA government
200	Company became Elroy Engineering on June 26, 1973.	Elroy Engineering - 1973
260	Qantas project for airport tarmac buses: diesel, petrol or electric. Tender submission jointly with a consulting firm at Beecroft. Qantas hijack caused the funding for the tarmac buses to cease and the opportunity evaporated	Qantas - airport tarmac buses Tender submission for Qantas tarmac buses
305	Adaptation of electric vehicles for city transport, design modifications for Termobile and Townobile. Various suppliers offered support in terms of supplies including: BHP, Dunlop, Chloride Batteries, John Lysates	IEAust transport engineering panel. Electric vehicles: Termobile, Townobile Suppliers: BHP, Dunlop, Chloride Batteries, John Lysates
325	Prototype building. First battery powered tarmac buses in Australia. Funding for these prototypes came from life savings and suppliers	Prototyping Funding for prototyping
376	Building the prototype: rent a factory, employ labour and subcontract. Much of this was supported by the generosity of others including Ken Coles - rented a factory at Pennant Hills, JE Alan of Dural, subcontractor - contract body builders	Building prototype. Ken Coles JE Alan of Dural
415	Monocoque body and construction - efficiency and weight considerations. "Motor-in-wheels" drive unit. Gear and drive system design.	Monocoque body construction. "Motor-in-wheels" drive unit
468	Why use electric vehicles for transport.	Electric vehicles
500	Electrical design considerations	Electrical side of design

Tape : IEA SYD : NW2, Side B		
TIME	SUBJECT	NAMES & KEYWORDS
0	Electrical design aspects: subcontract when outside expertise is better outside.	Electrical design aspects.
	Traction and braking controllers.	
	Influence of electronics	
40	Different knowledge required in the design of electric vehicles.	Electric vehicle design.
	Design of traction motors	Traction motors
53	Townobile - concepts behind design. Tarmac buses were designed to requirements from first principles.	Townobile.
		Tarmac buses
84	Design concepts of Townobile and Termobile: monocoque vs. chassis body, structural design.	Townobile
		Termobile
		monocoque and chassis body structure
115	"Evolution" of the Townobile. Visitors from overseas - Germany interested in design.	Townobile
		Overseas interest
160	Setbacks from a senior engineer - blocked the progress of electric vehicles.	Setbacks in electric vehicle progress
	Launch of Townobile - Opera House steps: June 1976.	Launch of Townobile, 1976.
185	Opponents to electric vehicles including oil industry.	Opponents to electric vehicles.
	Problems with combustion vehicles and alternatives to oil.	Alternatives to combustion vehicles.
245	The need for Australian made vehicles and the need to export technology.	Australian made vehicles.
260	Overseas markets for electric vehicles including Beijing. The increase in the number of electric bus cities.	Overseas markets for electric vehicles.
285	Australia could be the global centre for electric vehicles.	Australia & electric vehicles
298	Funding problems and funding of development is affected by the vested interests of others.	Funding development problems.
350	Proposal for Sydney 2000 Olympic village cars, minibuses, buses.	Sydney 2000 Olympics
380	Four generations of electric vehicles allowing for 25 possible models of electric vehicles ranging from a small car or bike up to a 320 passenger megabus - a double decker articulated bus.	Townobile passenger bus, Postal delivery van, Electric farm tractor.
		Monocoque
		Motor-in-wheels
		Prototypes
480	Building of prototypes for Olympic buses.	Sydney 2000 Olympics

Tape : IEA SYD : NW3, Side A		
TIME	SUBJECT	NAMES & KEYWORDS
0	Townobile adaptable to car, minibus, delivery van.	Townobile
20	Comparison between conventional and electric car - cost, efficiency, number of moving parts.	Electric vs. conventional vehicles
40	Battery design - value for money, reliability, lead-acid batteries. Improvements in detail.	Battery design
70	Technical limitations, safety requirements.	Safety requirements
112	Support from colleagues, employees, contractors.	
140	General Motors and their progress with electric vehicles.	General Motors
150	Battery design - weight considerations, battery range, recharging. Electronic controls.	Battery design.
195	Crash and safety requirements, strength in design of the vehicles/	Safety requirements
215	New materials which are now being used for design: aluminium, stainless steel.	Materials: aluminium, stainless steel.
235	Life cycle of electric vehicles - 30 years as compared with 10 years for conventional vehicles.	Life span for electric vehicles.
275	Different materials used and their effect on the design - zinc coated steel, stainless steel, plastics.	Materials: stainless steel, zinc coated steel, plastics.
300	Remoteness of Australia and the effect on the success of the product.	Australia & it's remoteness
340	Economic effects on work, political environment and it's effect on the electric vehicle industry.	Economic and political environment
360	Solar powered vehicles - pros and cons.	Solar powered vehicles.
410	The future for Elroy Engineering, training successors for the business. Family background.	Elroy engineering and the future. Family background.
430	Quality standards, ISO 9000. Electric vehicle standards committee.	Quality standards and compliance with ISO 9000.
455	General Motors and Ford will probably take over small companies such as Elroy Engineering, but are currently not very interested in electric vehicles.	General Motors Ford
480	Viability and support for electric vehicles.	



Tape : IEA SYD : NW3, Side B		
TIME	SUBJECT	NAMES & KEYWORDS
0	Management side of running Elroy Engineering and being able to manage in a limited budget.	Managing Elroy engineering.
26	Public exhibitions have shown wide public support.	Beyond 2000 Exhibition, Darling Harbour.
42	Effects of cheap imported cars on the market; the vested interests of large motor companies.	
55	General Motors EV1 promotions and the prospects for the future.	General Motors
75	Cost of electric vehicles. Sydney 2000 Olympics and the probable pollution problems with using vehicles other than electric vehicles. Vision for using electric vehicles for all forms of transport during Olympics.	Sydney 2000 Olympics Pollution & it's effect on athletes. Homebush Bay
150	Concepts in promoting the various models of electric vehicles.	
180	Vision for Sydney city - interchange buses around city and use electric vehicles only in the city centre.	Vision for Sydney's traffic management.
220		SOCOG, government, transport minister support for electric vehicles
250	Sweden is only a small country, but have become a large supplier of combustion vehicles, the same could happen for Australia and electric vehicles.	Sweden
265	Demonstration of vehicles in time for NSW elections in 1999 - the concept will be taken up by a "visionary government".	1999 NSW elections, government.
185	In retrospect. Difficulties working in engineering - trying to convince others.	Difficulties & retrospective comments.